LIGHTCURVE ANALYSIS AND ROTATION PERIOD FOR ASTEROID 5147 MARUYAMA

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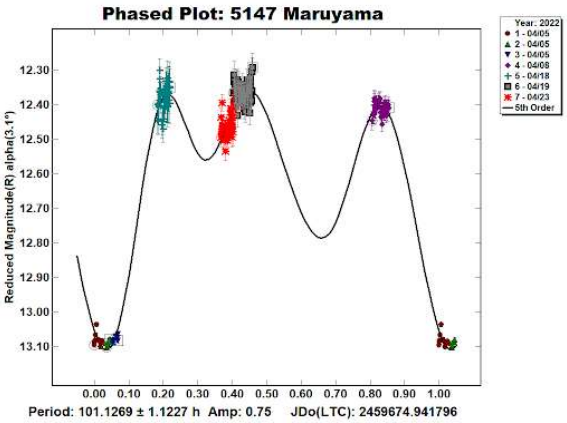
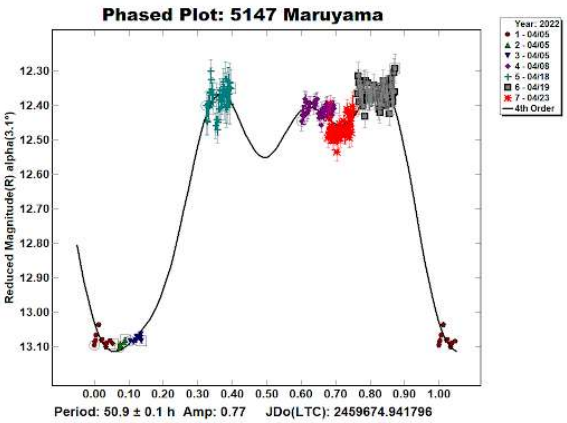
Photometric lightcurve analysis was applied to asteroid 5147 Maruyama based on observations taken in 2022 April. Observations were made from Australia and Malta to determine the rotation period of 5147 Maruyama. We used *MPO Canopus* to analyze the lightcurve of our asteroid in order to determine its rotation period to be P = 50.9 ± 0.1 h.

5147 Maruyama is a main-belt asteroid that was discovered on 1992 Jan 22 by Hiroshi Kaneda and Seiji Ueda. The Asteroid Lightcurve Database (Warner et al., 2009) does not have any previous rotation period data for Maruyama. 5147 Maruyama has a semi-major axis of 2.618 AU, an orbital period of 1547.536 days, and a diameter of 7.655 km. The absolute magnitude of the asteroid is 12.56 (JPL).

Photometric observations were taken of Maruyama in 2022 April at Siding Spring Observatory in Australia (MQ62) and at the Flarestar Observatory in San Gwann, Malta (MPC 171). The telescope used in Australia was a Planewave 17" CDK 0.43-m f/6.8 reflector equipped with a FLI ProLine E2V CCD47-10-1-109 CCD. The telescope used in Malta was a Meade SSC-10 Schmidt-Cassegrain f/6.3 equipped with a Morovian G2-1600 CCD. In both cases, a 300-second exposure time through a luminance filter was used for the capture of the images. Data analysis was performed using *MPO Canopus.*

In total, 219 images were used for photometric lightcurve analysis. Multiple Fourier models were tested and two potential rotation periods were found. The first potential rotation period was P = 101.12 ± 1.12 h. The second potential rotation period was P = 50.9 ± 0.1 h. The first appears to be twice the period of the second, which fits somewhat better with the data. Moreover, the error in the second plot was much lower at only 0.1h. The 101.1-hour fit was decided to be overfit to the data. The unusually low minima of the lightcurve may indicate that 5147 Maruyama has unusual qualities (one half of its surface possessing a much lower albedo, for example). This period should be considered provisional. More data are necessary during future apparitions in order to confirm this provisional period.





Acknowledgments

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Number	Name	yyyy mm/dd	Phase	L_{PAB}	B_{PAB}	Period(h)	P.E.	Amp	A.E.	Grp
5147	Maruyama	2022 04/05-04/27	3.0,11.6	195.7	-6.1	50.9	0.1	0.77		MBA

Table I. Observing circumstances and results. The phase angle is given for the first and last date. If preceded by an asterisk, the phase angle reached an extrema during the period. L_{PAB} and B_{PAB} are the approximate phase angle bisector longitude/latitude at mid-date range (see Harris et al., 1984). Grp is the asteroid family/group (Warner et al., 2009).